

**CLAIMS**

1. A method for scanning an object with a surface measurement probe mounted on a coordinate positioning machine, the probe having a definable servo direction vector, the method comprising the steps of:  
5 using translational movement of the coordinate positioning machine to move the probe along an at least part nominally spiral path about an axis which  
10 intersects the object;  
wherein the servo direction vector for the probe is directed nominally towards the axis of the at least part nominally spiral path;  
and wherein the servo direction vector for the  
15 probe is at an angle to said axis of the nominally spiral path and at an angle to a plane perpendicular to said axis of the at least part nominally spiral path.
2. A method according to claim 1 wherein the object  
20 has an unknown surface profile.
3. A method according to any of claims 1 or 2 wherein the object has a free form surface.
- 25 4. A method according to any preceding claim wherein the surface measurement probe comprises a contact probe having a deflectable stylus.
5. A method according to claim 4 wherein the method  
30 comprises a further step of moving the probe parallel to the direction of the probe servo direction vector of the probe to control probe deflection.
6. A method according to any of claims 1-3 wherein

the surface measurement probe comprises a non contact probe.

7. A method according to claim 6 wherein the method  
5 comprises a further step of moving the probe parallel to the direction of the probe servo direction vector of the probe to control probe offset.

8. A method according to any of claims 6 or 7 wherein  
10 as the probe moves along the at least part nominal spiral path, it is rotated to keep its line of sight directed towards the axis which intersects the object.

9. A method according to any preceding claim wherein  
15 the method includes the step of maintaining the probe on the nominally spiral path by movement of the probe perpendicular to the direction of the servo direction vector of the probe.

20 10. A method according to any preceding claim wherein translational movement of the coordinate positioning machine to move the probe along an at least part nominally spiral path about an axis which intersects the object is achieved by:

25 defining a second axis along which the probe servo direction vector is parallel, said second axis being at an angle to said axis which intersects the object;

rotating the second axis for an at least part revolution about the first axis and translating the

30 second axis in a direction parallel to the first axis;

moving the surface measurement probe to keep it on the axis.

11. A method according to claim 7 wherein the second

axis intersects the surface of the object to be measured.

12. A method according to any preceding claim, wherein  
5 the servo direction vector of the probe is angled at 45 degrees to the axis intersecting the part.

13. A method according to any preceding claim, wherein  
the angle between the probe direction vector and the  
10 axis which intersects the object is varied during the scan.

14. A method for scanning an object with a surface  
measurement probe comprising the steps of:  
15 defining a first axis of the object;  
defining a second axis, said second axis being at  
an angle to the first axis;  
rotating the second axis for an at least part  
revolution about the first axis and translating the  
20 second axis in a direction parallel to the first axis;  
moving the surface measurement probe to keep it on  
the second axis.

15. A method for scanning an object according to claim  
25 14 wherein the probe is servoed in the direction of the second axis to keep the probe at the desired distance from the object.

16. A method according to any of claims 14 or 15  
30 wherein the probe is servoed a direction perpendicular to the second axis to keep the probe on the second axis.

17. Apparatus for scanning an object comprising:

a surface measurement probe mounted on a coordinate positioning machine, said coordinate positioning machine having drive means to enable the probe to be driven translationally in several axes;

5 a controller which controls said drive means to move the probe along an at least part nominally spiral path about an axis which intersects said object;

wherein the controller controls the drive means such that the servo direction vector of the probe is  
10 directed nominally towards the centre of said axis of the at least part nominally spiral path;

and wherein the controller controls the drive means such that the servo direction vector of the probe is at an angle to said axis of the at least part  
15 nominally spiral path and at an angle to a plane perpendicular to said of the at least part nominally spiral path.